

Work Order ID 70305

Thursday, June 02, 2011 2:51:33 PM

Page 1

Item ID: D206-667-203TRN

Accept

Setup Start

Revision ID:

Stop

Item Name: Crosstube Turning Detail

Start Date: 6/2/2011 Start Qty: 1.00

Cust Item ID:

Required Date: 6/17/2011 Req'd Qty: 1.00

Customer:

Reference:

Approvals: Process Plan: CL Date: 11/06/02 Tooling: _____ Date: _____
QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Run Start

Stop

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

Draw Nbr	Revision Nbr
----------	--------------

D206-667-243	Rev C
--------------	-------

100

0.00



Mori Seiki

MORI SEIKI CNC LATHE LARGE

Memo

0.00

Mori Seiki CNC Lathe Large

1-Fill tube with sand & install plugs DT8534 on both ends as per Folio FA089

2-Turn first side as per Folio FA089

3-Blend transition lines only, **do not sand whole tube**:

*Use mill bastard file, brush file repeatedly with file card.

*Do not use sandpaper coarser than 320 grit.

110

QC1- Inspect dimensions to dimension sheet

0.00



QC

Memo

0.00

Quality Control

ok 11/07/04

MM-L 11/06/23

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: D206-667-203TRN PAR #: N/A Fault Category: Machining NCR: Yes No DQA: 1A Date: 11.07.09
11700 Resolution: Use as is Disposition: Use as is QA: N/C Closed: OK Date: 11/09/11

NCR: <u>70305</u>		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
11.07.09	100	C.D. is upto 0.004" under tolerance. R.C. program	<u>CP</u> 11.07.09 <u>OS/42</u>	M.S. still positive per attached S.R. Acceptable	<u>MP/16</u> 11/07/09	<u>and</u> 11/07/09	<u>CP</u> 11.07.09 <u>OS/42</u>	<u>u0704</u>

NOTE: Date & initial all entries

Work Order ID 70305



Page 2

Thursday, June 02, 2011 2:51:33 PM

Item ID: D206-667-203TRN

Accept



Setup Start



Revision ID:

Stop



Item Name: Crosstube Turning Detail

Start Date: 6/2/2011 Start Qty: 1.00



Cust Item ID:

Required Date: 6/17/2011 Req'd Qty: 1.00



Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start



QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

120

0.00



MORI SEIKI CNC LATHE LARGE

Mori Seiki

Memo

0.00

Mori Seiki CNC Lathe Large

1-Turn second side as per Folio FA089

2-Blend transition lines only, **do not sand whole tube**:
*Use mill bastard file, brush file repeatedly with file card.
*Do not use sandpaper coarser than 320 grit.

3-Remove sand and plugs

4-Scrib part# and batch #

MML 11/06/23

130

0.00



QC1- Inspect dimensions to dimension sheet

QC

Memo

0.00

Quality Control

smk 11/07/04

1 0

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Work Order ID 70305

Thursday, June 02, 2011 2:51:33 PM



Page 3

Item ID: D206-667-203TRN

Accept



Setup Start



Revision ID:

Stop



Item Name: Crosstube Turning Detail

Start Date: 6/2/2011 Start Qty: 1.00



Cust Item ID:

Required Date: 6/17/2011 Req'd Qty: 1.00



Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start



QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop

Sequence ID/
Work Center IDOperation
DescriptionSet Up/
Run Hours

Tool ID

Tool #

Plan
CodeAccept
QtyReject
QtyReject
NumberInsp.
Stamp

140

QC8- Inspect parts - second check

0.00

B.A.

11/07/04



QC

Memo

0.00

Quality Control

1

0

150

Crosstubes Chemical Conversion

0.00

JW 11-06-05
BE

HandFXtube

Memo

0.00

Hand Finishing Crosstubes

160

QC3- Inspect Part Finish

0.00



QC

Memo

0.00

Quality Control

DP

11-7-5

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Work Order ID 70305



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Thursday, June 02, 2011 2:51:33 PM

Item ID: D206-667-203TRN

Accept



Setup Start



Revision ID:

Stop



Item Name: Crosstube Turning Detail

Start Date: 6/2/2011 Start Qty: 1.00



Cust Item ID:

Required Date: 6/17/2011 Req'd Qty: 1.00



Customer:

Reference:

Run Start



Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Stop



QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID

Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

170

0.00



Packaging

Packaging

Memo

0.00

Packaging

Identify and Stock in kanban rack Location: LG

Handwritten signature/initials

11-06-05

180

0.00



QC21- Final Inspection - Work Order Release

QC

Memo

0.00

Quality Control

11/7/5 *Handwritten signature*

11-07-05

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Picklist Print

Thursday, June 02, 2011 2:51:31 PM

Page 1
T

Work Order ID: 70305



Parent Item: D206-667-203TRN



Parent Item Name: Crosstube Turning Detail


Start Date: 6/2/2011

Required Date: 6/17/2011

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:A 08-03-06 new issue DD verified by:ec
IPP Rev B 08.04.02 Removed polish EC verified by: DD
IPP Rev C 09.01.06 ECN 08-562 EC verified by:DD

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D6004-115 		Manufactured	No			100	Each	34.0000	1	1			

Crosstube Material

Location

Loc Qty

Loc Code

LG

34

34685

5

38336

29

1

mm.c 11/06/22

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Item	Qty -243	Part Number	Description
1	X	D206-667-243	CROSSTUBE ASSEMBLY (206L HIGH AFT)
2	1	D6004-115	CROSSTUBE
3	2	D2873-043	NUT PLATE
4	2	D2873-045	NUT PLATE
5	2	D2892-1	SUPPORT
6	4	D3595-063-450	RUBBER CUSHION
7	4	MS21920-22	CLAMP
8	14	MS20601AD4W10	RIVET (OR NAS9302B-4-10)
9	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299- 947-100, TYPE II, CLASS 2 ADHESIVE)

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6004-115
FINISHED LENGTH = 104.91±0.020
- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: SCRIBE DART PART NUMBER "D206-667-243" AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS.
- 7) WEIGHT: 21.9 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE.
- 9) RUN CUTTER OFF PART WHERE INDICATED. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 11) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 12) INSTALL D2892-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 13) INSTALL MS21920-22 CLAMPS WITH D3595-063-450 RUBBER CUSHIONS TO SECURE THE D2892-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMP MECHANISMS ARE LOCATED ON CROSSTUBE SUPPORTS.
- 14) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS ARE SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

CL11/06/02
W10: 70305

RELEASED
08/11/06

C	REVISE GENERAL NOTES/PART LIST (ZN D7-1); REORGANIZED VIEWS AND REFORMATTED DRAWING TO CURRENT STANDARDS. D3595-063-450 WAS D2856-400-773 (ZN D6-2 & A5-2); REMOVED REF. & ADD TOLERANCES (ZN 4-3, C5-3, D3-3); RELOCATED FLAG #6 (ZN A8-3) PER NCR 210; MOVED TURNING DETAIL & UPDATED TOLERANCE TO SHEET 4.	RF	08.11.06
B	ADD HOLES AND NUT PLATES FOR COMPATABILITY WITH BHT/AA SKUDTUBES	PH	05.07.26
A	NEW ISSUE	CP	00.11.17
REV.	DESCRIPTION	BY	DATE
DESIGN	RF	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
DRAWN	RF	DRAWING NO.	REV. C
CHECKED	RF	D206-667-243	SHEET 1 OF 4
MFG. APPR.	RF	TITLE	SCALE
APPROVED	RF	CROSSTUBE ASSY (206L HIGH AFT)	NTS
DE APPR.	RF	COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSES OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	
DATE	08.11.06		

12 D2892-1 SUPPORT
2 PL

15 MS21920-22 CLAMP
4 PL

13 D3595-063-450
RUBBER CUSHION
4 PL, (UNDER CLAMP)

B

B

A4-2

D206-667-603

B7-2

C

D206-667-243
ASSEMBLY DETAIL
(VIEW LOOKING FWD)

FWD

6°

13 15
MS21920-22 CLAMP REF

12
D2892-1 SUPPORT REF

C

D3595-063-450
RUBBER CUSHION
REF

D5-2 SECTION B-B
SCALE 5X

D2873-043
NUT PLATE

MS20601AD4W10
RIVET, 4 PL

D2873-045
NUT PLATE

MS20601AD4W10
RIVET, 3 PL

90°
REF

VIEW A-A:
CUFF DETAIL
SCALE 4X

RELEASED
08/11/06

D2873-043
NUT PLATE

MS20601AD4W10
RIVET, 4 PL

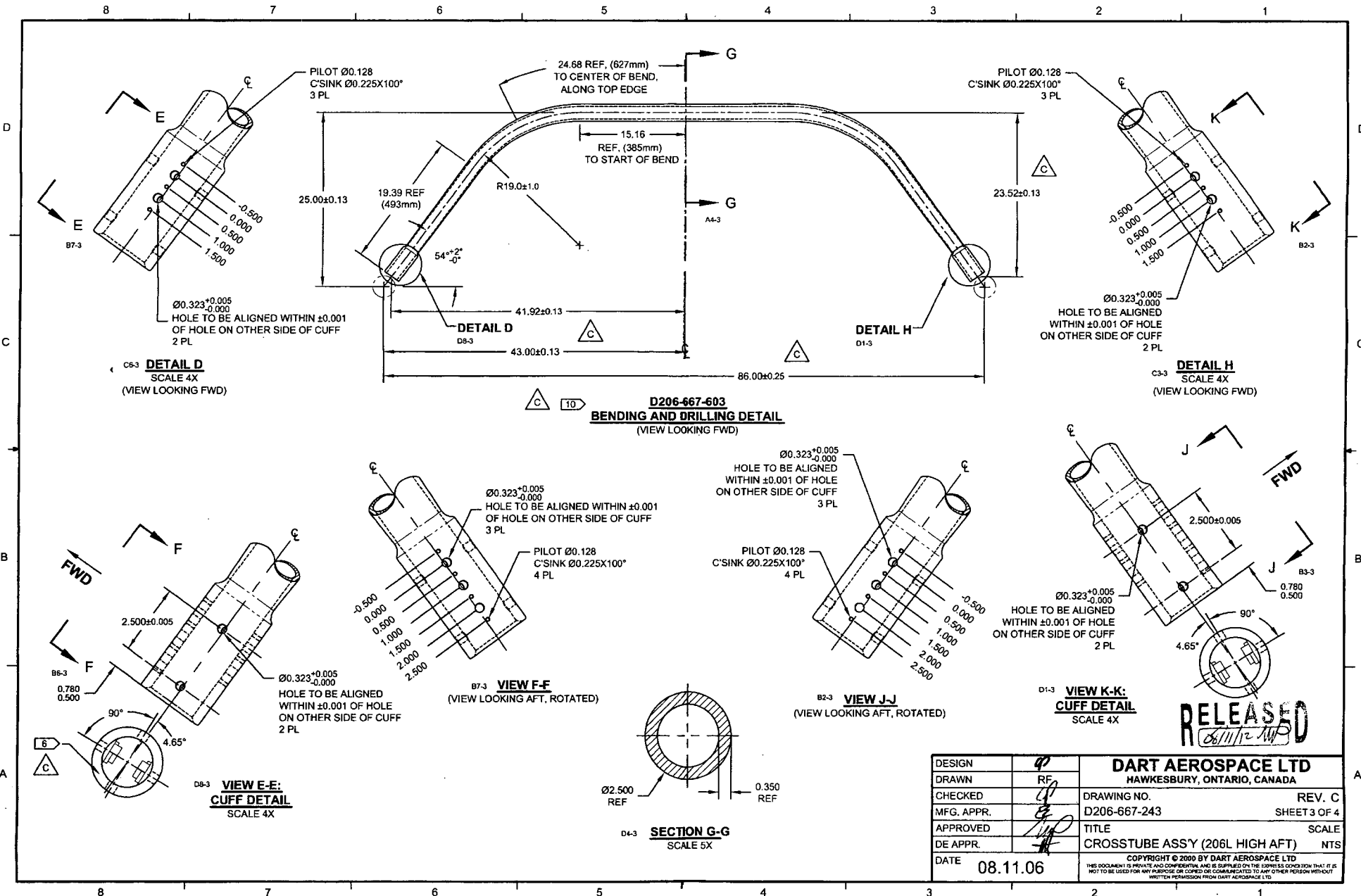
D2873-045
NUT PLATE

MS20601AD4W10
RIVET, 3 PL

90°
REF

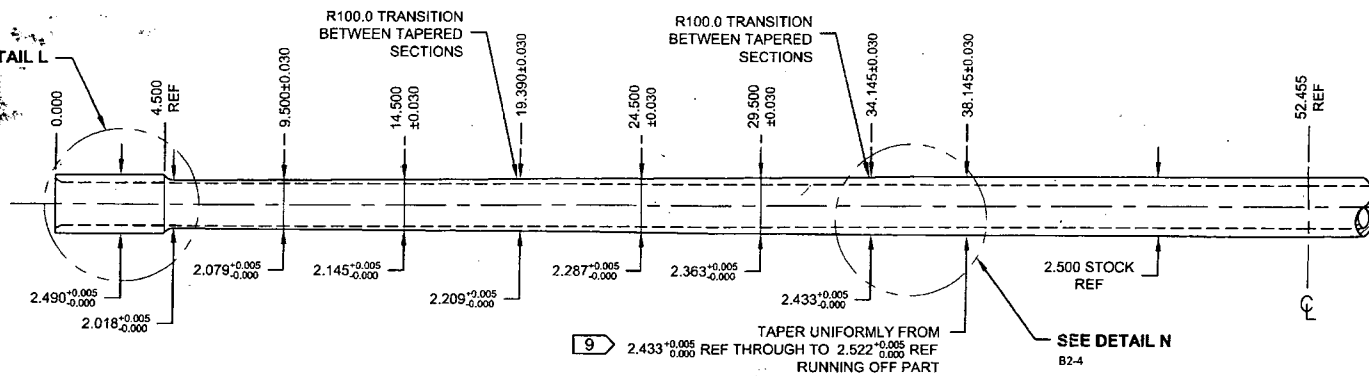
VIEW C-C:
CUFF DETAIL
SCALE 4X

DESIGN	9	DART AEROSPACE LTD	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	9	DRAWING NO.	REV. C
MFG. APPR.	9	D206-667-243	SHEET 2 OF 4
APPROVED	9	TITLE	SCALE
DE APPR.	9	CROSSTUBE ASS'Y (206L HIGH AFT)	NTS
DATE	08.11.06	COPYRIGHT © 2000 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSES OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

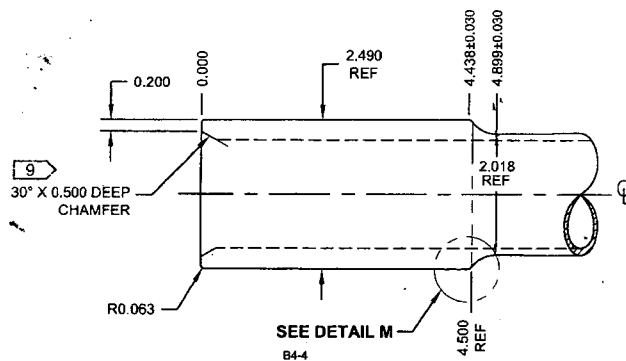


DESIGN	4	DART AEROSPACE LTD	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	4	DRAWING NO.	REV. C
MFG. APPR.	4	D206-667-243	SHEET 3 OF 4
APPROVED	4	TITLE	SCALE
DE APPR.	4	CROSSTUBE ASS'Y (206L HIGH AFT)	NTS
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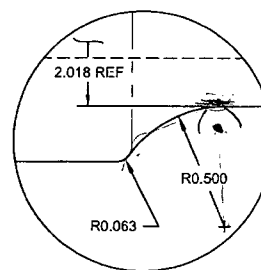
SEE DETAIL L
B7-4



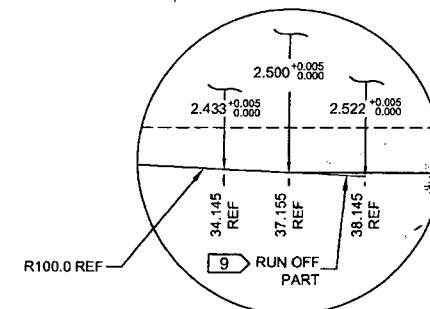
TURNING DETAIL



DETAIL L: CROSSTUBE CUFF
NOT TO SCALE



DETAIL M: CUFF TRANSITION
NOT TO SCALE



DETAIL N: TAPER RUN-OFF
NOT TO SCALE

RELEASED
08/11/06

DESIGN	9	DART AEROSPACE LTD	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	RF	DRAWING NO.	REV: C
MFG. APPR.	RF	D206-667-243	SHEET 4 OF 4
APPROVED	RF	TITLE	SCALE
DE APPR.	RF	CROSSTUBE ASS'Y (206L HIGH AFT)	NTS
DATE	08.11.06	COPYRIGHT © 2000 BY DART AEROSPACE LTD	
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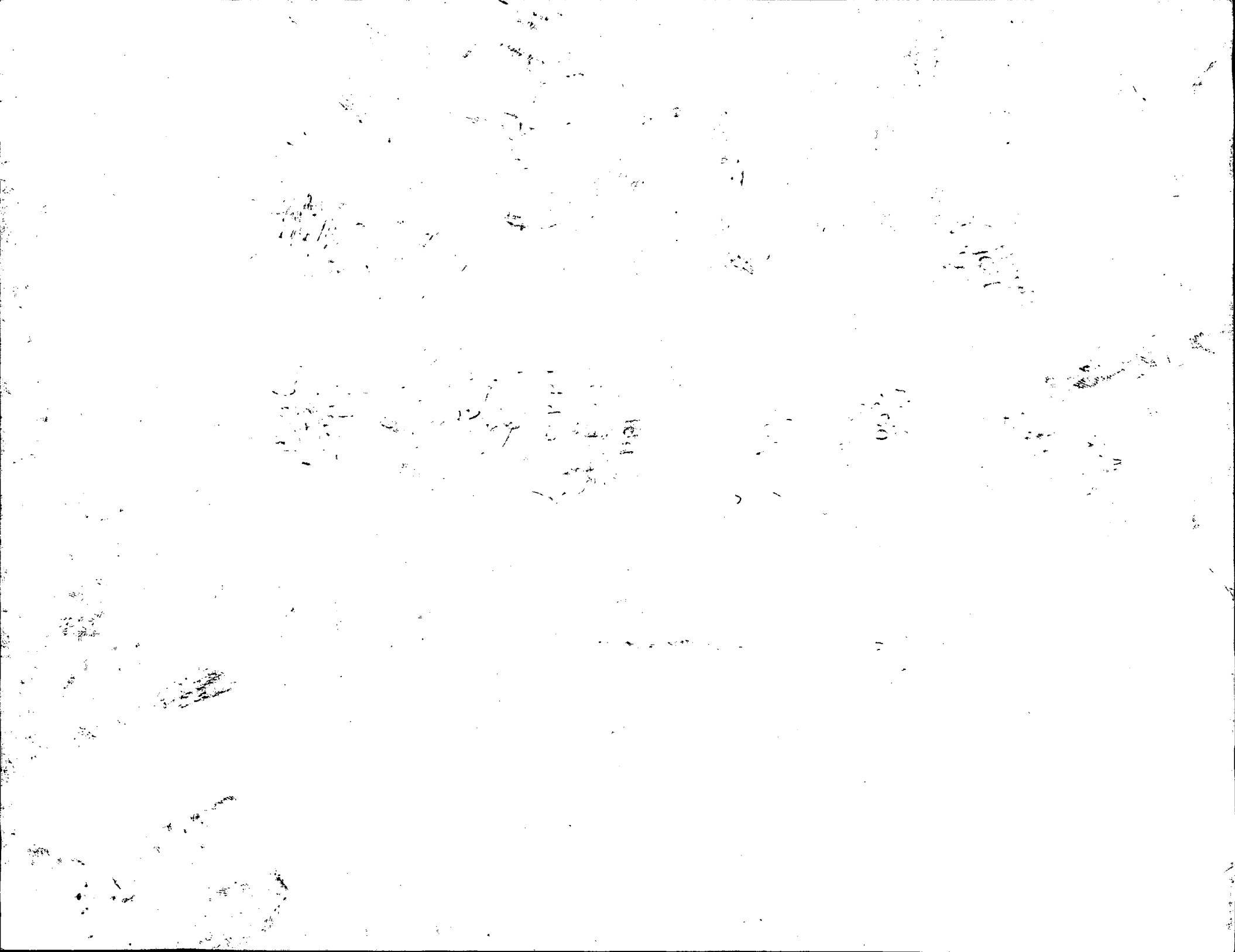
DART AEROSPACE LTD	Work Order:	70305
Description: Crosstube Assembly	Part Number:	D206-667-243
Inspection Dwg: D206-667-243 Rev: C		Page 1 of 1

FIRST ARTICLE INSPECTION CHECKLIST

Inspection Sheet	Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.490	+0.005/-0.000	2.494	✓		mic	CNC-04
	2.018	+0.005/-0.000	2.024	✓		"	
	2.079	+0.005/-0.000	2.084	✓		"	
	2.145	+0.005/-0.000	2.150	✓		"	
	2.209	+0.005/-0.000	2.213	✓		"	
	2.287	+0.005/-0.000	2.288	✓		"	
	2.363	+0.005/-0.000	2.362		✓	"	(2.360) After transition has been filed down
	2.433	+0.005/-0.000	2.438	✓		"	
	0.200	+/-0.010	.205	✓		vern	JF-01
	0.500 x 30°	+/-0.010	.500 x 30	✓		"	
	R0.063	+/-0.010	0.063	✓		RG	
	R0.500	+/-0.010	.500	✓		"	
	4.438	+/-0.030	4.410	✓		vern	JF-01
SIDE B	104.91	+/-0.020	104.92	✓		tape	mm.L-02
	2.490	+0.005/-0.000	2.494	✓		mic	CNC-04
	2.018	+0.005/-0.000	2.024	✓		"	
	2.079	+0.005/-0.000	2.084	✓		"	
	2.145	+0.005/-0.000	2.150	✓		"	
	2.209	+0.005/-0.000	2.213	✓		"	
	2.287	+0.005/-0.000	2.288	✓		"	
	2.363	+0.005/-0.000	2.362		✓	"	(2.359) After transition has been filed down
	2.433	+0.005/-0.000	2.438	✓		"	
	0.200	+/-0.010	.205	✓		vern	JF-01
	0.500 x 30°	+/-0.010	.500 x 30	✓		"	
	R0.063	+/-0.010	0.063	✓		RG	
	R0.500	+/-0.010	.500	✓		"	
	4.438	+/-0.030	4.410	✓		vern	JF-01

Measured by:	<i>MAN, V</i>	Audited by:	<i>B.A</i>	Preliminary Approval:	N/A
Date:	<i>11/06/23</i>	Date:	<i>11/07/04</i>	Date:	N/A

Rev	Date	Change	Revised by	Approved
A	06.09.01	New Issue (P/O D206-667-203)	KJ/JLM	
B	10.08.25	Dwg Rev updated	KJ	



3.3 Aft Crosstube Comparison

The Dart aft crosstube is defined by drawing D206-667-243. The Bell aft crosstube dimension are based on data from BHT-206L3-MM-5 (Ref 1, page 5). The relative locations of the sections used in this comparison are shown in Figure 4 (on page 7). Table 2 gives the cross-sectional properties of the Bell and Dart crosstubes at locations that correspond to changes in taper of the Dart crosstubes.

Table 2: Aft High-Gear Crosstube Cross-sections

SECTION	Cross tube	Damage Tolerance	O.D. (in)	I.D. (in)	Area (in ²)	Inertia (in ⁴)
A-A	Bell Aft	0.000	2.500	1.820	2.307	1.379
	Bell Aft w/ dam. tol.	0.005			2.302	1.371
	Dart Aft	0.000	2.500	1.800	2.364	1.402
	Dart Aft w/ dam. tol.	0.015			2.246	1.332
B-B	Bell Aft	0.000	2.422	1.820	2.006	1.151
	Bell Aft w/ dam. tol.	0.005			2.001	1.143
	Dart Aft	0.000	2.413	1.800	2.028	1.149
	Dart Aft w/ dam. tol.	0.015			1.911	1.080
C-C	Bell Aft	0.000	2.357	1.820	1.762	0.976
	Bell Aft w/ dam. tol.	0.005			1.757	0.969
	Dart Aft	0.000	2.345	1.800	1.774	0.969
	Dart Aft w/ dam. tol.	0.015	2.341		1.656	0.901
D-D	Bell Aft	0.000	2.291	1.820	1.521	0.814
	Bell Aft w/ dam. tol.	0.005			1.516	0.807
	Dart Aft	0.000	2.277	1.800	1.527	0.804
	Dart Aft w/ dam. tol.	0.015			1.410	0.738
E-E	Bell Aft	0.000	2.226	1.820	1.290	0.667
	Bell Aft w/ dam. tol.	0.005			1.285	0.660
	Dart Aft	0.000	2.209	1.800	1.288	0.654
	Dart Aft w/ dam. tol.	0.015			1.170	0.588
F-F	Bell Aft	0.000	2.117	1.820	0.918	0.447
	Bell Aft w/ dam. tol.	0.005			0.913	0.442
	Dart Aft	0.000	2.113	1.800	0.962	0.463
	Dart Aft w/ dam. tol.	0.015			0.861	0.399
G-G	Bell Aft	0.000	2.008	1.820	0.565	0.259
	Bell Aft w/ dam. tol.	0.005			0.560	0.254
	Dart Aft	0.000	2.018	1.800	0.654	0.299
	Dart Aft w/ dam. tol.	0.015			0.553	0.236
H-H	Bell Aft	0.000	2.500	1.820	2.307	1.379
	Bell Aft w/ dam. tol.	0.005			2.302	1.371
	Dart Aft	0.000	2.490	1.800	2.325	1.372
	Dart Aft w/ dam. tol.	0.030			2.192	1.301

→ 0.890

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Revision: A

Date: 01.01.24

4.3 Aft Crosstube Strength Comparison (refer to Table 2 on page 9)

Table 4: Aft High-Gear Crosstube Strength Comparison

SECTION **	Cross tube	Bending Ultimate (lb*in)	Bending Yield (lb*in)	Tension Ultimate (lb)	Tension Yield (lb)	Shear Ultimate (lb)
A-A	Bell aft w/ DT	72393	61424	151944	128922	96692
	Dart aft w/ DT	82041	70745	172963	148254	92097
	Margin of Safety	0.13	0.15	0.14	0.15	-0.05
B-B	Bell aft w/ DT	62306	52866	132043	112037	84028
	Dart aft w/ DT	68918	59442	147114	126097	78333
	Margin of Safety	0.11	0.12	0.11	0.13	-0.07
C-C	Bell aft w/ DT	54293	46067	115941	98374	73781
	Dart aft w/ DT	(59187)	51059	127547	109326	67915
	Margin of Safety	(0.09)	0.11	0.10	0.11	-0.08
D-D	Bell aft w/ DT	46505	39459	100040	84882	63662
	Dart aft w/ DT	49887	43044	108540	93034	57794
	Margin of Safety	0.07	0.09	0.08	0.10	-0.09
E-E	Bell aft w/ DT	39164	33230	84820	71969	53976
	Dart aft w/ DT	40996	35380	90092	77222	47971
	Margin of Safety	0.05	0.06	0.06	0.07	-0.11
F-F	Bell aft w/ DT	27545	23371	60282	51148	38361
	Dart aft w/ DT	29101	25122	66328	56852	35317
	Margin of Safety	0.06	0.07	0.10	0.11	-0.08
G-G	Bell aft w/ DT	16724	14190	36975	31372	23529
	Dart aft w/ DT	18033	15573	42595	36510	22680
	Margin of Safety	0.08	0.10	0.15	0.16	-0.04
H-H	Bell fwd w/ DT	72393	61424	151944	128922	96692
	Dart fwd w/ DT	80479	69400	168790	144677	89875
	Margin of Safety	0.11	0.13	0.11	0.12	-0.07

*The negative shear margins are addressed in Section 4.7

**for Section A-A, the worst case corresponds to min stock OD instead of max stock OD, so the calculation is slightly different then the sample calculation presented in section 4.1

M.S. still positive
with 0.004" smaller
O.D.

GP 11.07.04